

2006 Annual Report

A. Overview/Summary

The NAHB Research Center, located about 25 miles from Washington, DC, in Upper Marlboro, Md., was established in 1964 as a separately incorporated, wholly-owned subsidiary of the National Association of Home Builders (NAHB). The 235,000 individual members of the NAHB and the 800 state and local home builder associations are involved in the construction of over 80% of U.S. homes. The Research Center's staff includes engineers, economists, architects, planners, market demographers, and other professionals in related disciplines. The Research Center provides product commercialization consulting services to a wide variety of housing industry stakeholders, provides third-party quality assurance verification and testing services to building product manufacturers, builders, and trade contractors, and conducts a wide range of dissemination and training activities for builders, remodelers, and other housing industry service purveyors. Our research is sponsored by NAHB, public agencies, and private-sector clients.

Mission Statement: The NAHB Research Center's mission is to promote innovation in housing technology to improve the quality, durability, affordability, and environmental performance of homes and home building products.

B. Activities of 2006

- *New Laboratory Testing and Market Research Facility Construction.*
Construction of an addition to accommodate an expanded, state-of-the-art product testing laboratory began in September. The new facility will incorporate advanced testing equipment to broaden the company's capabilities as an accredited test laboratory and as a quality assurance and certified product listing agency. The two-story, 42,000-square-foot facility will triple the size of the existing laboratory and house all the Research Center's product testing and certification activities, as well as the majority of its market research activity. The lab's new capabilities will include large-scale thermal testing, acoustic performance testing, and two-story shear wall testing. Its increased size will also facilitate testing and simulation of real-world conditions, such as wind-driven rain and wind-blown debris on whole-house models. Nearly 1,000 square feet of space will be dedicated to a sophisticated market research facility. This dedicated market research facility will include an observation gallery overlooking the testing area so that focus group participants can observe products in use during real time. The Research Center's existing laboratory will continue to operate

during construction. Construction is scheduled to be completed by May 2007 and dedication ceremonies are planned in conjunction with the NAHB's spring board member meetings in June 2007.

- *National Housing Endowment Scholar-in-Residence Program.* The Endowment provided funding for a three-month residency for Makarand Hastak, Ph.D., Head of Construction Engineering and Management at Purdue University. During his tenure at the NAHB Research Center, Dr. Hastak collaborated with land development staff of the Research Center and NAHB and visited local regulatory bodies to evaluate wastewater treatment options for residential land development. This work is summarized in the paper, "Decision Model to Evaluate Decentralized and Centralized Wastewater Treatment Options for Residential Land Development," co-authored by Alex Duran, Ph. D., of the Research Center. This paper and working spreadsheet model will be the subject of future work by graduate students at Purdue University and will also provide topics for potential research.
- *Water Resources and Land Development Forum.* This effort, sponsored by the National Housing Endowment, brought industry, regulatory, and academic experts together via an electronic bulletin board and teleconferences to obtain current consensus recommendations on needed areas of research and information dissemination. The report and a searchable bibliographic database are available on the National Center for Land Development Technology website that will be launched in 2007.
- *OSB Product Certification Program.* A new certification service was established for producers of oriented strand board structural panels. The product certification ensures that the manufacturer has an ISO 9001 Quality Management System in place and that the product was produced under the guidelines of NIST's Voluntary Product Standard, PS2. Weyerhaeuser Company is the first client to obtain U.S. certification. Weyerhaeuser's Canadian mills are scheduled to be certified in 2007.
- *Design Guide Publication.* A design guide, "Residential PEX Water Supply Plumbing Systems," was prepared by the NAHB Research Center for the Plastics Pipe Institute (PPI), the Plastic Pipe and Fitting Association (PPFA), and PATH. The guide provides the information and resources needed by builders, designers, and trade contractors to design and install cross-linked polyethylene (PEX) water supply systems in residential buildings. It includes comprehensive design concepts and installation guidelines to increase the acceptance and proper use of PEX. This guide will introduce potential users to PEX and enable current users to optimize the performance of PEX systems and to minimize costs.
- *Moisture Protection Pamphlet for Siding Installers.* In an effort to stem the tide of moisture-related damage, a free pamphlet for siding installers was updated and made available on the NAHB Research Center's ToolBase web portal. The

pamphlet, which was updated by NAHB's Building Product Issues Committee and the NAHB Research Center, covers several types of siding and veneer applications, including brick, manufactured stone, stucco, thin brick, and EIFS over wood sheathing or paper-backed products. It provides guidance on designing and installing a weather-resistive barrier, protecting exterior walls against condensation and moisture penetration, and protecting moisture sensitive materials against decay, mold, fungus, and rot. "Moisture Protection of Exterior Walls — An Installer's Guide," is available free of charge in English and Spanish from the ToolBase website (www.toolbase.org) and in bulk from NAHB by calling 800-368-5242 x8291.

- *Website Restructuring and Redesign.* The ToolBase web site (www.toolbase.org), a reliable resource for technical information on innovative and advanced building products and practices, has recently re-launched with an improved site architecture and navigation system. As always, the site features the PATH Technology Inventory, ToolBase Newsletters, and summary information and reports from relevant industry field evaluations and case studies. Now, the site also includes easy-to-get-to sections on Building Systems, Home Building Topics, Design and Construction Guides, Best Practices, and Construction Methods.
- *Construction of Near-Zero Energy Home Completed.* In conjunction with builder Bob Ward Companies of Edgewood, Md., a new high-performance production home was completed and open to the public. This project was a cooperative effort by the NAHB Research Center, the Maryland Energy Administration, the U.S. Department of Energy's Building America program, and Bob Ward Companies. The NAHB Research Center aided design decisions and provided technical guidance during the installation of advanced technologies in the 3,724-square-foot home, dubbed the Maximum Efficiency Greenland (MEG). The MEG features advanced technologies and design techniques that save energy and improve comfort as well as a photovoltaic system and solar thermal system for the on-site production of energy. The home is expected to use less than half the energy that would be used by a similar code-compliant home. The MEG house opened to the public with a ribbon cutting ceremony and open house on June 23.
- *BUILDER Magazine Article.* The article, "Study probes impact of zero energy homes in reducing future U.S. energy consumption," appeared in BUILDER Magazine (04/01/06). The article highlighted the NAHB Research Center's new report, "The Potential Impact of Zero Energy Homes."
- *Safety Seminars.* An OSHA-sponsored series of seminars related to safety on residential construction sites is being coordinated by the NAHB Research Center and offered through local home builder associations and builders. The seminars are offered in English and Spanish and are oriented toward trade contractors' craftsmen and managers.

- *Technical Assistance to the Steel Framing Alliance.* The Research Center provided technical assistance for rebuilding in the Gulf Coast for the Steel Framing Alliance by updating, refining, and developing a range of educational pieces designed to support builders seeking to use steel framing. Specific pieces include: Building Inspector Training Seminar, Building Inspector, and Plumbing and Electrical Trade field guides for steel framing, Cold-Formed Steel Framing ToolBase Tech Spec, and a community college training module which covers the design of a demonstration project house.
- *Prescriptive Method for Connecting SIP Roofs to Concrete Wall Systems.* Work began on developing cost-effective guidelines for connecting concrete walls to structural insulated panel roof systems in residential construction. This research will produce an easy to read publication which identifies connection details that reduce design costs and improve building quality, and effectively communicates these details to builders and contractors. The publication will be distributed by HUD through multiple channels.
- *Preliminary Planning in Hurricane Katrina-Affected Regions.* Work began in 2006 on a project to identify and examine current and future barriers to housing reconstruction and repair in the Gulf of Mexico region (primarily southern Louisiana and coastal Mississippi). During the project, direct interviews with affected audiences (e.g., communities, homeowners, suppliers, builders) will be conducted to ascertain the factors which are limiting reconstruction. After the issues are clearly understood, staff will work with affected audiences to develop plausible solutions which can produce measurable results. These solutions, in turn, will be reviewed by local housing experts in the affected region, placed in a larger regional context, and synthesized into various actionable strategies.
- *Energy Upgrade Code Analysis Tool.* A web-based calculator to determine the cost effectiveness of energy efficiency technologies is under development. The tool will model a variety of typical house types, and users will have the option to compare selected building/energy code baseline scenarios to user defined alternatives for cost effectiveness.
- *Housing Market Research.* A market research survey is underway to identify key changes that home builders are undergoing due to the softening of the housing market.
- *Construction Methods to Restraining the Spread of Fire between Detached Dwellings.* As the cost of land continues to increase, more houses are built with the minimum fire separation distance allowed by building codes. Recent testing conducted by NIST showed that this practice has the potential to increase fire hazard through fire spread from one unit to the next unless adequate mitigation measures are provided that are beyond the current code requirements. The proposed research will focus on the development of cost-effective fire-resistance

construction methods for houses located in urban settings and separated by code minimum or near-minimum distances.

- *Multi-Year Advanced Residential Building Systems Research.* The Building America Program (BAP), sponsored by the United States Department of Energy (U.S. DOE), is focused on reducing energy use and develops advanced energy systems for new and existing residential buildings. The near term goal is to achieve an average of 50% whole house energy savings in new single family housing in five climate zones by the year 2015. The NAHB Research Center's work under this project has been to conduct research in accordance with the following goals:
 - Accelerate the development and implementation of advanced energy systems in new and existing residential construction through application of systems engineering research projects by cross-cutting industry teams;
 - Reduce residential building energy consumption, construction site waste, construction cycle time and warranty and call back costs;
 - Increase the use of recycled materials, labor productivity, system durability and reliability;
 - Develop innovative technologies and strategies that enable the U.S. housing industry to deliver environmentally sensitive, quality housing on a community-scale while maintaining profitability and competitiveness of homebuilders and product suppliers; and
 - Increase housing value and affordability for U.S. homeowners.

Activities in 2006 included completion of prototype house with Bob Ward Companies in Maryland, mixed humid climate design options for building envelopes, study of quality assurance practices to improve thermal performance of houses, and evaluating opportunities to enhance thermal performance in panelized construction.

- *ANSI Accreditation.* The NAHB Research Center's accreditation as a standards development organization was renewed with the American National Standards Institute. New operating procedures were issued:
<http://www.nahbrc.org/technical/standards/standards-development.pdf>.
- *Model Green Standards Development.* The NAHB Research Center is processing the NAHB Model Green Building Guidelines through the ANSI consensus process. Public notice of intent to write a new standard was filed in June 2006 and a consensus committee will be formed in 2007 to oversee updating of the Guidelines and the response to the public review.

C. Sample Continuing Activities

- *Testing and Labeling Building Products.* Continued to test and label building products including insulation, solid surface materials, and kitchen and bath fixtures.

- *Monitor Building Material Performance.* Continued to monitor the performance of light-gauge steel and measure the corrosion rate in occupied homes.
- *Annual Consumer Practices Survey and Annual Builder Practices Survey.* Conducted two annual national surveys of building material use rates in new and remodeled homes
- *Monitoring of Advanced Technologies.* Continued to monitor nine field evaluations/demonstrations of innovative technologies in support of the Partnership for Advancing Technology in Housing (PATH). Continued to monitor and evaluate performance of multiple photovoltaic systems installed on homes in New York State.
- *Housing Award Programs.* Continued to administer two national awards programs—the EnergyValue Housing Award and the National Housing Quality Award.
- *National Housing Quality Program.* The Research Center's NHQ (National Housing Quality) Program continues to gain national recognition. Over 375 trade contractors have already achieved NHQ-Certification and nearly 2,200 additional companies have completed the training requirements and are working toward certification. Additionally, nearly 50 builders have earned NHQ Certification since Home Builder program was launched in January 2005. Another 25 builders are actively preparing for their first NHQ qualification audit and an equal number are expected to enter the program in 2007. In 2006, the Research Center continued to reach out to product manufacturers with the NHQ Certified Training Materials program. The intent of this program is to offer assistance to the builders and trade contractors going through or certified under the NHQ program by providing installation instructions to the individuals actually performing the tasks in the field. The NHQ program now encompasses each major contributor in the home building process by providing a roadmap to quality that assures that the home buyer's expectations are being met or exceeded.
- *ToolBase Industry Portal.* Expanded the industry penetration of the TOOLBASE non-commercial, web portal for technical information relative to the home building industry. The site had a record 272,000+ user sessions in March 2006, and a monthly average of 240,000 user sessions, which is an 11% increase from the monthly average in 2005.
- *Energy Efficiency in Remodeling Information.* Developed supporting materials to improve the energy efficiency of existing homes for remodeling contractors.

D. Sample Publications for 2006

- Directory of Accessible Building Products 2007

- ToolBase News (technical newsletter produced quarterly; distributed to over 80,000 building professionals)
- ToolBase E-News (bi-weekly building industry news service that focuses on information technology and other advanced technologies in home building)
<http://www.toolbase.org/Newsletters/EnewsHome.aspx>
- Quality Matters monthly (electronic newsletter created as a resource for builders, trade contractors and manufacturers that are interested in participating in the Research Center's NHQ Certification and training programs)
<http://www.nahbrc.org/news/qualitymatters/index.aspx>.
- Energy Efficiency Remodeling training modules- Introduction, Building Systems, House as a System, Kitchens, Bathrooms, Space Conversions, Room Additions, and Mechanical Systems (instructor and student guides) are available on ToolBase:
 - <http://www.toolbase.org/ToolbaseResources/level4DG.aspx?ContentDetailID=3647&BucketID=4&CategoryID=42>
- Potential Impact of Zero Energy Homes
<http://www.toolbase.org/PDF/CaseStudies/ZEHPotentialImpact.pdf>
- Residential PEX Water Supply Plumbing Systems
<http://www.toolbase.org/Design-Construction-Guides/Plumbing/pex-design-guide>
- "Why Manufacturer Participation Matters in the Building-Code Development Process," paper presented at the American Real Estate and Urban Economics Association 2006 Mid-year Meeting

E. Other Dissemination Activities

NAHB Research Center Web Pages (www.nahbrc.org/ and www.toolbase.org). The two web sites of the NAHB Research Center describe Research Center services and publications, serve as a technical resource for anyone seeking residential housing information, and contain descriptions and updates on PATH projects and other selected current projects. The ToolBase web site provides technical assistance to builders through the Internet portal, an online FAQ database, a quarterly technical newsletter, and a bi-weekly electronic news service.

External Web Pages. Launched and maintained web site for the Consortium of Housing Research Centers, www.housingresearch.net. During 2006 there were approximately 4,100 user sessions to the site. Current Research and Members were the most popular areas. Most popular downloads included the Penn State Report, the UFL Report, the Arizona State Report, and the NAHB Research Center Report.