High-Performance Housing

By Joseph Laquatra

Building America is a housing industry-led, cost-shared partnership program of the U.S. Department of Energy that has the following goals:

- Reduce whole-house energy use by 40-70% and reduce construction time and waste;
- Improve indoor air quality and comfort;
- Integrate clean onsite power systems;
- Encourage a systems engineering approach for design and construction of new homes;
- Accelerate the development and adoption of high-performance residential energy systems.

The Building America Building Science Consortium (BSC) has developed a Web-based, climate-specific technical resource for designing and building high-performance homes that use at least 30% less energy for space conditioning and hot water than homes built for compliance with the 1995 Model Energy Code. This resource is entitled Houses That Work II (HTWII) and is based on insights and experience gained from five years of building over 8,000 production homes across the country. It is available at www.buildingscience.com/housesthatwork. HTWII is an updated version of Houses That Work, which was published in 2001. HTWII includes a hygro-thermal regions map of new energy climate zones that are proposed for the International Energy Conservation Code; climate-specific best practices for high-performance homes; three building profiles per climate; and a Building Materials Property Table. HTWII also features numerous electronic references for readers who want additional information on building science, a field that has grown exponentially thanks in part to the Building America program.

The entire state of New York is within the Cold Climate Hygro-Thermal Region. Building profiles for houses with three foundation types are featured for this region: full basement, crawl space, and slab-on-grade. These profiles recognize that homes in cold climates face significant moisture drive from the building interior and into the building envelope during the heating season, as well as ground water and moisture issues common in homes with full basements or crawl spaces. Best practices for these homes result in energy performance for space conditioning and hot water that is 40% better than the 1995 Model Energy Code, which is 10% better than ENERGY STAR® performance requirements. Also addressed in the best practices are system engineering details that utilize advanced framing methods, efficient duct distribution, and design details that address durability with regard to wall and roof assembly drying potential, a continuous drainage plane, and a continuous thermal barrier.

---

1 This article originally appeared in the Fall 2004 Issue of Housing and Home Environment News

* Joseph Laquatra, Ph.D. is a professor in the Department of Design and Environmental Analysis at Cornell University.
HTWII is a valuable resource for builders interested in increasing their profit margins through high-performance house construction. Construction details are clear, and practical guidance is offered that addresses common difficulties builders face in today’s market. For example, the five-page Building Materials Property Table covers vapor permeability, flammability, and other relevant issues of sheathings, claddings, interior wallboards, insulation, flooring, building papers, and coatings. A Web link is provided to help with resistance to advanced framing methods from local code officials. And highly understandable discussions are provided about the importance of continuous drainage planes, air barriers, and thermal barriers.

The authors of HTWII recognize that this resource cannot be considered as anything but guidance. It is not intended to replace professional engineering, expert design, good judgment, or common sense. But it is a valuable addition to the growing number of resources in the area of building science. Companion publications will also help builders advance their understanding of constructing high-performance houses that are energy efficient, affordable and comfortable for buyers, free of moisture-related problems, and unattractive to pests. The Energy & Environmental Building Association’s (EEBA) *Builder’s Guide for Cold Climates* and the EEBA *Water Management Guide* are chief among these.

*Builder’s Guide for Cold Climates* is a concise, highly-detailed book. It contains over 150 illustrations that include details for houses that are efficient in their use of energy and resources, are durable, and are comfortable. It is distributed by the Energy and Environmental Building Association (EEBA) and is $35 for EEBA members; $45 for non-members. It can be ordered on-line at: https://www.eeba.org/mall/builder_guides.asp.

Design detail from *Houses That Work II*. 
The EEBA Water Management Guide is a 51-page excellently illustrated booklet that provides details to ensure that walls, roofs, and foundations are built so that they shed water to the exterior through continuous drainage planes. The control of rain and ground water is a key factor in keeping houses durable and mold-free. The step-by-step illustrations in this booklet make it easy to understand how to achieve this. Contact the EEBA Book Store Web site for availability information.