RESEARCH in Progress

Coalition for Advanced Wood Structures
a university, industry, government partnership

Extended Plate and Beam—Field Assessment of an Energy-Efficient Light-Frame Wood Wall System

An extended plate and beam (EP&B) design was developed at Home Innovation Research Labs (Home Innovation) in an effort to provide traditional light-frame wall construction details that are compatible with continuous insulating sheathing to encourage wide-spread adoption of high-R walls and promote higher energy efficiency in new houses (Fig. 1). The new wall design substantially increases insulation and ensures moisture management while relying on common methods and materials for framing, insulation, and siding attachment. It incorporates the use of foam sheathing uniquely integrated with a structural framing system that allows for installation of the wood structural panels outside the foam insulation. The EP&B wall design can be easily fabricated on-site or factory panelized, thus reducing transition risk to builders.

This project involves field assessment of the EP&B wall framing system, which can achieve nominal thermal performance of R25–R30 using common light-frame construction details. The primary EP&B design features include R25+ wall insulation, reduced framing thermal shorts, exterior structural sheathing for shear load resistance and siding attachment, clear drainage plane and flashing surface for openings, and rim header design that eliminates headers in most wall sections. These attributes are expected to accelerate the adoption of high R-value walls and to facilitate production of houses that exceed current energy codes.

Figure 1. Wall cut-away of the EP&B framing method.

Background

In August 2014, Home Innovation completed preliminary research on the feasibility of the EP&B construction method. The evaluation included structural verification testing, cost assessment relative to other advanced wall systems, and design assessment focused on development of construction details. The work was performed in consultation with New York State builders, businesses, and code officials, in conjunction with New York State Research and Development Authority. The EP&B method was deemed viable by all parties, with the exception of its use in high wind speed zones without additional testing and engineering re-

Advanced Housing Research Center
Forest Products Laboratory
Madison, Wisconsin

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view. Figure 2 shows features of the EP&B wall system. The EP&B method is suitable for 2×4 and 2×6 wall stud framing; the climate zone location of the selected demonstration project will influence wall dimensions and the aggregated R-value of the wall.

Objective

The objective of this research project is to conduct a field assessment of the EP&B wall framing system. One demonstration site will be located in a cold climate zone (such as CZ4, 5, or 6). The evaluation is expected to map a clear pathway to field implementation of the EP&B method based on use of traditional framing techniques and minimizing transition issues for the trades and the builder.

Approach

The proposed work includes four tasks: (1) identifying a builder partner in a cold climate and selecting one of the builder's home plans for the project; (2) assisting the builder with updating the home plans to include the EP&B design; (3) field evaluation of the framing; and (4) instrumenting and monitoring the moisture performance of the EP&B system over one heating season. The proposed test plan involves in situ test and documentation of the EP&B wall framing system in the construction of a new house in New York State. The house will be constructed following the work scope and design details developed for this EP&B method. The method has been judged to be adaptable to either conventional field framing or panelization within a factory; therefore, either approach is acceptable for demonstration project purposes.

Expected Outcomes

The research results will improve understanding of field performance of the EP&B wall system and advance solutions that integrate structural and energy performance to ensure that wood construction remains the system of choice for the residential industry in the United States. This research project will also extend the knowledge and capabilities of the on-going programs through the partnership between the FPL Coalition for Advanced Wood Structures and Home Innovation.

Timeline

We expect to identify a builder within the first quarter of 2015 and work with the builder to have a plan approved by May 2015. Construction can then proceed during the optimal ambient weather conditions during summer of 2015. Field monitoring and evaluation will be completed by May 2016, with a final report expected by August 2016.

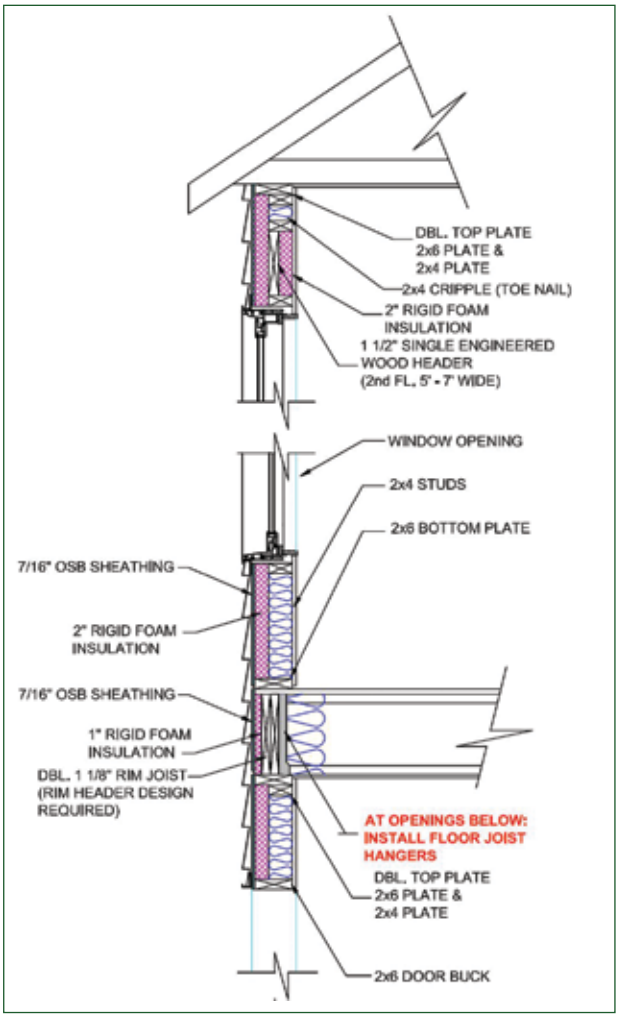

Figure 2. EP&B detail.

Cooperators

USDA Forest Service, Forest Products Laboratory
Home Innovation Research Labs

Contact Information

Vladimir Kochkin
Home Innovation Research Labs
Upper Marlboro, Maryland
(301) 430-6249; vkochkin@homeinnovation.com

Xiping Wang
USDA Forest Service, Forest Products Laboratory
Madison, Wisconsin
(608) 231-9461; xwang@fs.fed.us